

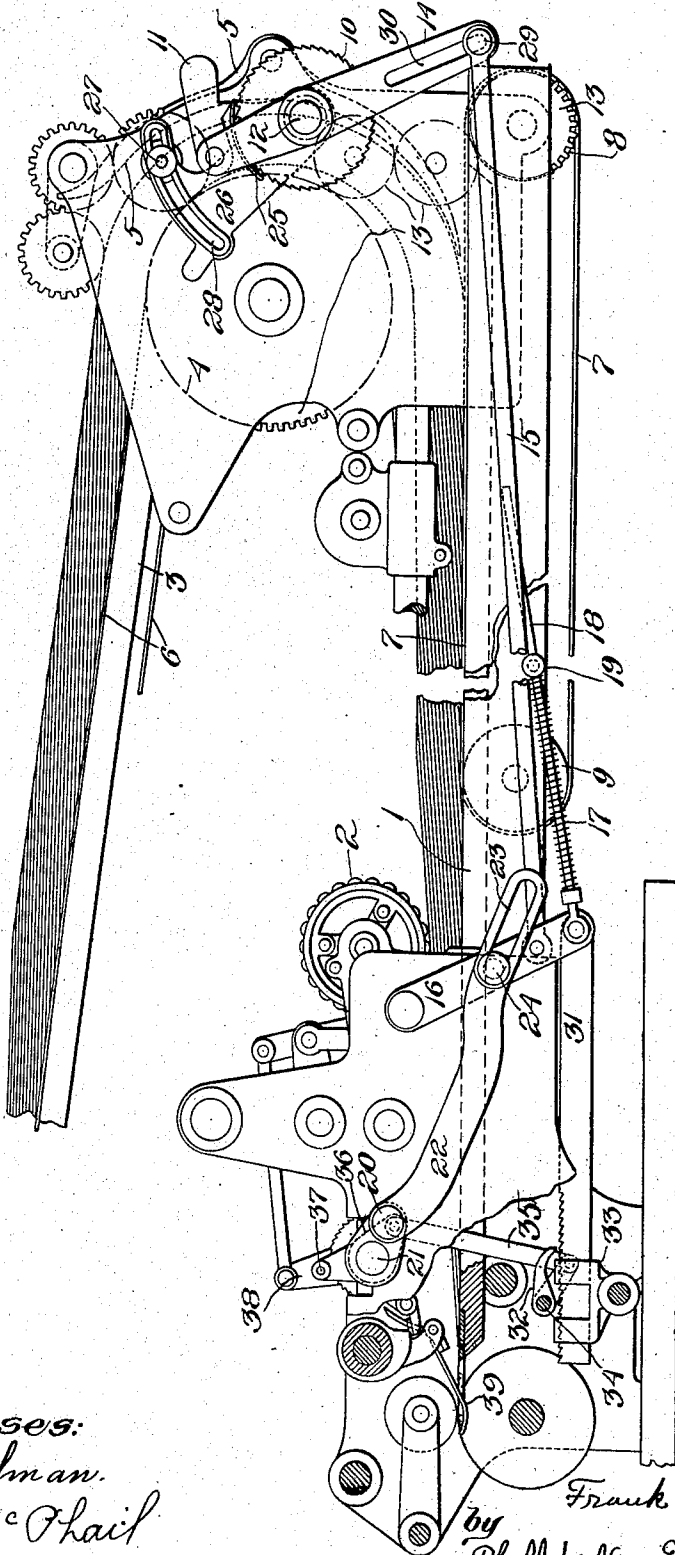
F. L. CROSS.
SHEET FEEDING MACHINE.
APPLICATION FILED JAN. 21, 1909.

1,041,747.

Patented Oct. 22, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
M. L. Kilman.
H. D. McPhail

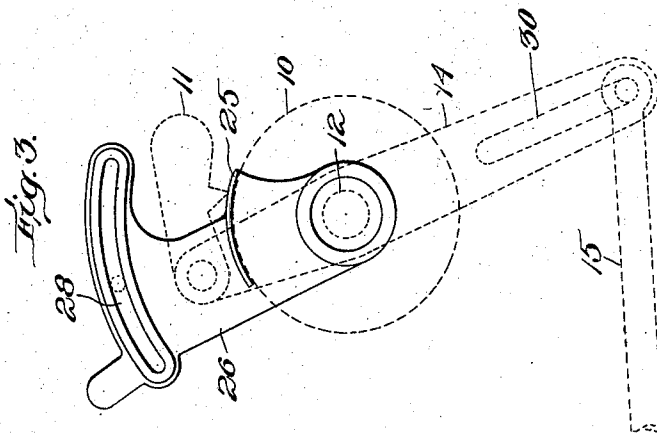
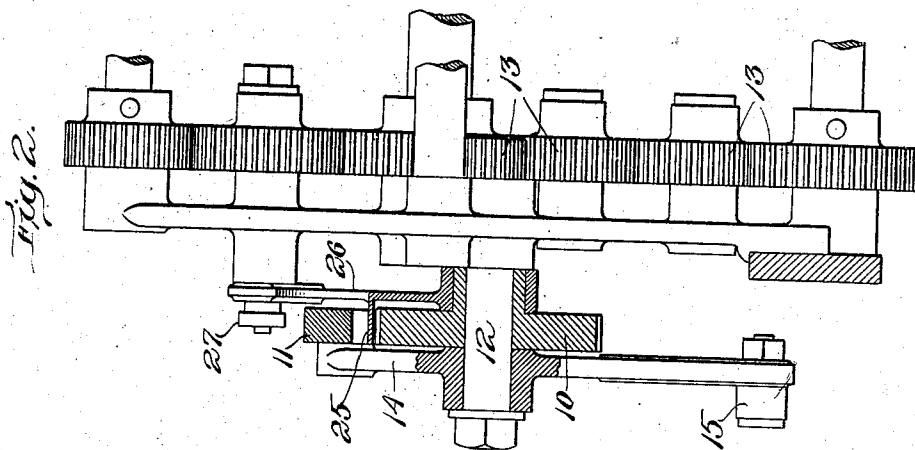
Inventor:
Frank L. Cross
by *Phillips Van Everen & Fish*
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

FRANK L. CROSS, OF WOLLASTON, MASSACHUSETTS, ASSIGNOR TO CROSS PAPER FEEDER COMPANY, A CORPORATION OF MAINE.

SHEET-FEEDING MACHINE.

1,041,747.

Specification of Letters Patent.

Patented Oct. 22, 1912.

Application filed January 21, 1909. Serial No. 473,521.

To all whom it may concern:

Be it known that I, FRANK L. CROSS, citizen of the United States, residing at Wollaston, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Sheet-Feeding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to that class of sheet feeding machines in which a bank of feathered or fanned out sheets is presented to combing devices which act to further fan or feather out the sheets, thus advancing the top sheet to a greater distance than the sheets beneath it, so that the top sheet may be separated from the bank and fed to machines or devices for further manipulating or acting upon it.

In this class of machines it has been customary to throw the combers into operation at regular intervals, and to provide sheet operated trips for throwing the combers out of operation when the front edge of the sheet has been advanced into position to be acted upon by the delivery devices. In order that the combers may act to properly separate the top sheet and advance it into position to be operated on by the delivery devices, the bank of sheets should be so fed to the combers that the interval during which the combers remain in action shall be constant within certain limits. There should, therefore, be no advance or feeding movement of the bank of sheets so long as the length of comb is normal or less than normal. When the comb increases, however, the bank of sheets should be so fed forward as to bring the front edge of the bank nearer to the comb controlling trip, and the feeding of the bank should continue until the comb becomes normal.

It is the object of the present invention to provide a simple and improved mechanism for feeding the bank of sheets which is so controlled that it is inactive to effect any substantial feed of the bank so long as the comb is less than a predetermined length, and is rendered active to feed the bank when the comb exceeds such length.

In machines of the type above referred to the length of time during which the combers should remain in action in order to secure a

proper separation of the sheets will vary with the character of the paper being operated upon, and one feature of the invention contemplates the provision in a machine in which a feathered bank of sheets is fed to combing devices of means for rendering the feeding mechanism substantially inactive to feed the bank when the comb is less than a predetermined length, which is adjustable to vary said length in accordance with the character of the sheets being operated upon.

A further feature of the invention contemplates the provision in a machine in which the feeding mechanism is inactive to effect a feed of the sheets so long as the comb is less than a predetermined length, of means for adjusting the feeding mechanism so that the feeding movement imparted to the bank may be varied in accordance with the character of the sheets being operated upon.

A further feature of the invention contemplates operating and controlling the mechanism for feeding a feathered bank of sheets to the combers by means of a pawl and ratchet held out of action during the first part of the comb, and a device for arresting or preventing movement of the pawl and ratchet which is inactive during the comb, but is rendered active when the combers are thrown out of action. When the comb is short, the movement preventing device or stop is rendered active while the pawl and ratchet are still out of action, and prevent movement of the pawl and ratchet to effect the feed. When the comb is longer than normal, however, the operation of the stop device to render it active is delayed, and therefore a movement of the pawl and ratchet to effect the feed is permitted. It is not material to the broader scope of this feature of the invention whether the feeding of the bank is effected by the pawl and ratchet during that comb which renders it active, or during the next comb, or during the interval between the combs. It is preferred, however, to so arrange and time the parts that the feed of the bank takes place during that comb which renders the pawl and ratchet active to effect the feed, as with this construction the feed is proportional to the length of comb, and a more accurate control of the bank is thus secured.

The invention also includes certain further features and combinations which will

be referred to in the claims, the advantages of which will be apparent to those skilled in the art.

The various features of the invention will be readily understood from an inspection of the accompanying drawings, in which—

Figure 1 is a side elevation of a paper feeding machine embodying the various features of the invention in their preferred forms, and Figs. 2 and 3 are details of the pawl and ratchet mechanism for feeding the bank of sheets.

As shown in the drawings, the bank of feathered sheets is supported upon a feed table 1 in position to be acted upon by combing wheels, one of which is indicated at 2. The bank of sheets is fed to the feed table from a supply table 3, the front end of which is arranged over the rear end of the feed table. The bank of sheets passes from the supply table to the feed table through a curved throat formed between the drum 4 and the curved guides 5. The bank upon the supply table rests upon feed tapes 6 which pass around the drum 4, and the bank upon the feed table rests upon feed tapes 7 which pass over pulleys 8 and 9. The feed of the bank is effected by movements imparted to the drum and feed tapes.

The mechanism for operating the drum and feed tapes comprises a ratchet wheel 10 and an actuating pawl 11. The ratchet wheel is secured upon a shaft 12 which is connected through suitable gearing 13 with the drum 4 and pulley 8. The pawl is pivoted upon the upper end of a pawl carrying lever 14 which is mounted to turn freely about the shaft 12. The lower end of the pawl carrying lever is connected by a link 15 with a rock arm 16. The rock arm is forced toward the left in Fig. 1, or in a direction to impart a feeding movement to the pawl 11, by the action of a spring 17 which surrounds a rod 18 pivoted to the end of the rock arm, and mounted to slide through a pin 19. The rock arm is moved toward the right, or in a direction to retract the feed of the pawl 11, by means of a crank pin 20 carried on the end of the cam shaft 21 of the machine, and connected with the rock arm by a link 22. The link 22 is connected with the rock arm through a slot 23 formed in the end of the link and arranged to ride over a pin 24 carried by the lever.

In the construction shown the parts are so timed that the feeding pawl 11 is in its retracted position at the time that the combers 2 are brought into engagement with the bank of sheets. Since the pawl is operated through a crank, the advance movement of the pawl will begin at the beginning of the comb. In order that the pawl and ratchet may be inactive during the first part of the comb, a guard 25 is provided which acts to

hold the pawl out of engagement with the ratchet for a certain part of its forward movement. This guard in the construction shown is in the form of a plate which projects laterally from an arm 26 and is arranged to overlie the periphery of the ratchet wheel and prevent the engagement of the pawl with the ratchet wheel. The arm 26 is mounted to turn freely upon the hub of the ratchet wheel, and is held in position by means of a clamping screw 27 which passes through a segmental slot 28 formed in the plate. By adjusting the arm 26 the position of the guard 25 may be varied to vary the length of time during which the pawl 11 is held out of engagement with the ratchet at the beginning of the comb. In order that the feeding action of the pawl after it engages the ratchet wheel may be varied to vary the extent of movement imparted to the bank by the pawl, the link 15 is adjustably connected with the lower end of the pawl carrying lever 14 by means of a pivot pin 29 adjustably secured in a slot 30 in the lower end of the pawl carrying lever.

In order that there may be no substantial feed of the bank of sheets so long as the comb is less than a predetermined length, means are provided for preventing movement of the feeding pawl which is inactive during the comb, but is rendered active when the comber is thrown out of action. In the construction shown, the means for preventing the movement of the feeding pawl comprise a ratchet bar 31 connected with the rock arm 16, and a pawl 32 which is thrown into engagement with the ratchet bar when the comber is thrown out of action. One end of the ratchet bar 31 is pivoted to the lower end of the rock arm 16, and the other end is supported upon a pivotally supported block 33. The pawl 32 is secured to a rock shaft 34, and is connected through a link 35 with one end of a lever 36 which is pivotally mounted upon the cam shaft 21. The upper end of the lever 36 is connected by a pin 37 with the arm 38 which forms a part of the mechanism for throwing the comber out of action. When the comber wheel is thrown into action, the lever 38 is swung toward the left in Fig. 1, and raises the pawl 32 so that it is out of engagement with the ratchet bar 31. When the comber wheel 2 is thrown out of action, the lever 38 swings toward the right, and the pawl 32 is engaged with the teeth of the ratchet bar 31, preventing or arresting the movement of the bar, and thus preventing or arresting the movement of the feed pawl 11. If the stop pawl 32 is engaged with the ratchet bar 31 while the feed pawl 11 is still held out of action by the guard 25, then the feed pawl will not engage the ratchet, and there will be no

feeding movement of the bank of sheets. If the comb is so long that the pawl 11 has passed off of the guard 25 before the stop pawl 32 is engaged with the ratchet bar 31, then the feeding pawl will engage the ratchet 11 and will advance the ratchet, and thus effect a feeding movement of the bank of sheets. This feeding movement will continue until the combing wheel is thrown out of action, when the advance of the feeding pawl will be arrested by the engagement of the stop pawl 32 with the ratchet bar 31. Thus the pawl and ratchet mechanism will remain inactive so long as the comb is short, but will be rendered active to effect a feed of the bank when the comb is long or above that for which the guard 25 is adjusted.

The mechanism for arresting and controlling the combing wheels may be of any suitable construction, and in the construction shown is similar to the mechanism fully illustrated and described in Patent No. 812,260, dated February 13, 1906. The combing rolls are thrown into action at regular intervals by cams (not shown), which are carried on the cam shaft 21 and are thrown out of action when the front edge of the top sheet engages and operates the trips, one of which is indicated at 39.

Having set forth the nature and object of the invention, and specifically described one form of apparatus in which it may be embodied, what I claim is:—

1. A sheet feeding machine, having, in combination, a comber, mechanism for feeding a feathered bank of sheets to the comber, means for rendering the feeding mechanism substantially inactive to feed the bank so long as the comb is less than a predetermined length, said means being adjustable to vary the length of comb requisite to render it active, substantially as described.

2. A sheet feeding machine, having, in combination, a comber, mechanism for feeding a feathered bank of sheets to the comber, means for rendering the feeding mechanism substantially inactive to feed the bank so long as the comb is less than a predetermined length, and means for adjusting the feeding mechanism to vary the feed in accordance with the character of the sheets being operated upon, substantially as described.

3. A sheet feeding machine, having, in combination, a comber, mechanism for feeding a bank of feathered sheets to the comber comprising a pawl and ratchet, means for rendering the pawl and ratchet inactive during a predetermined part of the comb, and means controlled by the sheet advanced by the comber for arresting the action of the pawl and ratchet, substantially as described.

4. A sheet feeding machine, having, in

combination, a comber, mechanism for feeding a bank of feathered sheets to the comber comprising a pawl and ratchet, means for holding the pawl and ratchet out of action during the first part of the comb, a device for preventing movement of the pawl and ratchet, and means for rendering the device inactive during the comb and active when the comber is thrown out of action, substantially as described.

5. A sheet feeding machine, having, in combination, a comber, mechanism for feeding a bank of feathered sheets to the comber comprising a pawl and ratchet, means for actuating the pawl and ratchet to effect the feed during the comb, means for rendering the pawl and ratchet inactive during a predetermined part of the comb, and means for arresting the feed when the comber is thrown out of operation, substantially as described.

6. A sheet feeding machine, having, in combination, a comber, mechanism for feeding a bank of feathered sheets to the comber comprising a pawl and ratchet, a guard for rendering the pawl and ratchet inactive during a predetermined part of the comb, and means for arresting the action of the pawl and ratchet when the comber is thrown out of operation, substantially as described.

7. A sheet feeding machine, having, in combination, a comber, mechanism for feeding a bank of feathered sheets to the comber comprising a pawl and ratchet, an adjustable guard for rendering the pawl inactive during the first part of the comb, and means for arresting the feeding action of the pawl at the end of the comb, substantially as described.

8. A sheet feeding machine, having, in combination, a comber, mechanism for feeding a bank of feathered sheets to the comber comprising a pawl and ratchet mechanism for reciprocating the pawl, a guard for rendering the pawl inactive during a predetermined part of the comb, and means rendered active by the sheet advanced by the comber for arresting the feeding action of the pawl, substantially as described.

9. A sheet feeding machine, having, in combination, a comber, a sheet operated trip for controlling the action of the comber, mechanism for feeding a bank of feathered sheets to the comber comprising a pawl and ratchet, means for rendering the pawl and ratchet inactive during the first part of the comb, a device for preventing the action of the pawl and ratchet, and connections between the comber and said device for rendering said device inactive when the comber is in action and active when the comber is thrown out of action, substantially as described.

10. A sheet feeding machine, having, in combination, a comb wheel, mechanism for feeding a bank of feathered sheets to the

comb wheel comprising a pawl and ratchet, means for preventing a feed of the bank during the first part of the comb, a device for preventing the feeding action of the pawl and ratchet, and means for rendering said device inactive during the comb and active when the comb wheel is thrown out of action, substantially as described.

11. A sheet feeding machine, having, in combination, a comb wheel, mechanism for feeding a bank of feathered sheets to the comb wheel comprising a pawl and ratchet, means for rendering the pawl and ratchet inactive during the first part of each comb, and means controlled by the sheet advanced by the comb wheel for preventing the feeding action of the pawl and ratchet, substantially as described.

12. A sheet feeding machine, having, in combination, a comb wheel, mechanism for feeding a bank of feathered sheets to the comb wheel comprising a pawl and ratchet, means for actuating the pawl and ratchet to

effect the feed during the comb, means for rendering the pawl and ratchet inactive during the first part of each comb, and means for arresting the feed when the comb wheel is thrown out of operation, substantially as described.

13. A sheet feeding machine, having, in combination, a comb wheel, mechanism for feeding a bank of feathered sheets to the comb wheel comprising a pawl and ratchet, a guard for rendering the pawl and ratchet inactive during the first part of each comb, and means for preventing the feeding action of the pawl and ratchet when the comb wheel is thrown out of operation, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

FRANK L. CROSS.

Witnesses:

WARREN G. OGDEN,
N. D. McPHAIL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."